Diagnostic Tools for Misspecification in Mixed Models

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Generalized linear mixed models have become a frequently used tool for the analysis of non-Gaussian longitudinal data. Estimation is often based on maximum likelihood theory, which assumes that the underlying probability model is correctly specified. Recent research is showing that the results obtained from these models are not always robust against departures from the assumptions on which they are based. Therefore, diagnostic tools for the detection of model misspecifications are of the utmost importance. In this talk, we propose a family of diagnostic tests that provide an alternative to the Information-Matrix Test (IMT) (White, 1982, *Econometrica* **50**, 1-25). However, unlike the IMT, the new tests do not involve third order partial derivatives of the log-likelihood, making them easy implementation-wise and diminishing their computational complexity. We will illustrate this with some exemplary SAS code.
The power of these tools to detect misspecification is studied via simulations. In this talk we will focus on misspecifications of the random-effects structure. In the context of linear mixed models, the new proposals seem to perform as good as the IMT. The new tests also enjoy good performance for generalized linear mixed models, which is important since the IMT is very difficult to apply in this context, owing to the lack of a closed form for the likelihood.